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NOTES FOR A SPEECH

BY THE

HONOURABLE DONALD J. JOHNSTON

MINISTER OF STATE FOR

SCIENCE AND TECHNOLOGY

AND FOR

ECONOMIC DEVELOPMENT

TO THE

CANADIAN INFORMATION PROCESSING SOCIETY


HOLIDAY INN HOTEL

KENT STREET, OTTAWA

MAY 19, 1983

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Ladies and gentlemen,

Let me first say that I am very pleased to have the opportunity to speak to you today. When I received your invitation, my imagination was piqued by your theme - "Converging Technologies" - because of the close connotation to the policy work that has occupied so many of my recent days. And I also looked forward to the challenge of finding a systematic way of explaining my thoughts on technology policy to such a systems oriented profession.

Just over two weeks ago, in the House of Commons, I was pleased to announce a Technology Policy for Canada. One of the most important issues that this policy addresses is the need to bring all the aspects of economic, industrial, social and science policies that influence, and are influenced by, technology into one manageable policy sphere.

Technology is all-pervasive; it touches each and every aspect of our lives. Any policy that addresses technology development must recognize this. It is the effective "convergence" of these related policy areas that will enable us to successfully manage technological change.

It has become almost commonplace to say we are now

experiencing a period of immense technological change -- and that our economies are facing a time of profound structural change. Such statements tend to raise the spectre of a society unable to employ all who seek employment, and this in turn can raise the accompanying spectre of citizens unable to participate in their economy and their society -- citizens reduced to a life of economic and even spiritual poverty.

This is indeed the spectre that has haunted many recent public debates.

As in most areas of economic debate, however, there are at least two schools of thought on this issue. The optimistic scenario is that technological change will not only produce more jobs, but also more lucrative jobs. This, in fact, has been our experience in the past.

If, for example, we were to look at the period between 1954 and 1982, we would see that real income per employee more than doubled while the participation rate in the workforce rose from 53% to 65%. This was an extraordinary period capable of absorbing a massive increase in the labour force while at the same time raising real income for everyone. I doubt whether anyone standing in 1954 would have imagined the achievements of these three decades.

It is this inability to visualize the professions of the future that leads other economists to suggest that we may indeed have more wealth, but we will have fewer jobs. These more pessimistic philosophers, in looking at the same period of 1954 to 1982 and seeing that the labour force would have to absorb 1 million workers leaving the agricultural labour force -- and also seeing a labour force growing at 3% per annum and a participation rate in the workforce rising from 50% to 65% -- would undoubtedly have predicted economic disorder and social upheaval.

My view is that no matter which of these scenarios is correct -- either more better paying jobs, or more wealth

but fewer jobs -- we have the means at our disposal to address these problems because society as a whole will be richer through technological development.

But let me return for a moment to the theme of convergence, because the structural adjustments which must take place over the next decade are not just the result of changes in our technological base, but flow from the convergence of at least six separate but interrelated economic streams -- a convergence which the pessimists could see as a threat of disastrous flood or a convergence which the more optimistic would see in terms of harnessable opportunities.

The six streams can be defined as;

- the ever increasing tide of inflation that has crept into every corner of the economy;

- the emergence, particularly in the newly industrialized countries, of competitive industries which have overtaken traditional Canadian industries;

- the increasing rate of labour-saving technological change in industrialized countries;

- the rapid social revolution in the industrialized countries which has led to an extraordinarily rapid rise in the proportion of the labour force seeking jobs;

- the dramatic tightening of monetary policy around the world in the early 1980's to stem the inflationary tide but which also brought on the deepest recession the world has experienced since the 1930's; and,

- the groundswell of longer-run Kondratieff-imaged patterns suggesting that many of the forces underlying the growth of the 1950's and 1960's were spent and a pause in the 1970's and 1980's was inevitable until new growth centres formed.

The current convergence of these six streams suggests to some that the 1980's will not be a period of ebullient growth -- but others, including myself, see it also as an opportunity to lay the necessary foundation for future growth. The technological revolution is proceeding -- in microelectronic controls, in information processing, in the biological sciences, in our extractive and processing industries, in our service industries -- and each of these areas provides us with the opportunity to increase productivity, to increase our prosperity.

The Technology Policy which I recently announced provides the framework from which we can, in an organized and deliberate way, recognize the opportunities before us and mobilize our interrelated policies and activities to ensure those opportunities do not pass us by.

Along with the Technology Policy announcement, I was pleased to be able to announce that the Prime Minister has established a Sub-Committee of Cabinet on Technology Development. This special Sub-Committee plays a very important role in effectively bringing together the various policy areas that influence, and are influenced by, technology development. Each Minister that sits on that Sub-Committee has the mandate to augment or change the specific policies, programs and activities which, in total, make up our technology policy. This is the first time such an approach to the management of technology development has been taken by the federal government. It is an approach which I am confident will see practical and valuable results.

The Sub-Committee's first task has been to confirm the policy directions for technology development in Canada -- which are outlined in the objectives to the Technology Policy -- and to translate these objectives into action. In fact, we have already seen some of these objectives translated into action in the Budget.

The Budget has set an important and timely precedent in earmarking over \$700 million for technology development

over the next two years. It is a precedent I am sure we have all welcomed; a precedent that highlights this government's commitment to our country's technological future.

The general objectives of the Technology Policy are, first, to strengthen the Canadian economy through the creation, application and diffusion of state-of-the-art technologies.

As a second objective, we intend to manage the process of technological development so that Canadians are aware of both the opportunities and problems that might arise.

Third, we must ensure that the benefits of technology development are shared equitably among all Canadians in every region.

And finally, we must encourage an environment within our country which stimulates scientific curiosity, innovation and technological excellence.

However, a comprehensive Technology Policy must look beyond the sphere of the federal government and take into account the contribution each sector of the economy makes to technology development. In this context, the federal government has set some detailed objectives for itself which relate to its interactions with the other sectors.

I do not want to use up all my time with you detailing these many specific objectives, but I would like highlight some which relate quite directly to the business environment within which the information processing industry operates.

The specific objectives relating to the business sector reflect the primacy of the private sector in initiating innovation and new investment. We must encourage an overall business environment that favours investment, innovation and enterprise.

In this regard, the Budget has made proposals for changes

in the current R&D tax incentive scheme which will significantly enhance the current R&D investment environment. Canada's tax incentives have been among the world's richest, but these proposals are aimed at making these incentives even more effective, and their application and administration simpler. Consultations with industry on these proposals are now beginning, and will be completed by July 1.

It is estimated that these proposals, if accepted by industry, would contribute a further \$100 million in industrial incentives for research and development. There is a significant enhancement to current tax benefits to industry, which, in terms of foregone revenue to the government, are already calculated to be over \$200 million for 1983. And I have not even yet mentioned the changes to the Investment Tax Credit in the April Budget, which apply to all businesses, and which likely provide R&D performers with an additional \$85 million in the first year in which they apply.

Our earlier consultations with business indicated that this was the sort of support to the business environment that they find most effective, and I am confident we will soon see their response in increased technology investment.

Another of our objectives for the business sector is to ensure current federal industrial support programs for technology development continue to effectively support industrial initiatives. Also, Canadian firms must have access to the most productive technologies available to ensure their competitive advantage and the best possible information regarding technological forecasting and assessment must be readily available.

These objectives will ensure that industry has the chance to recognize the opportunities being opened up through technological change, and has the fiscal resources to take advantage of them.

This is even more true for your industry, as it is on the

leading edge of technological change, and it will be first to see the opportunities before us. There is no question that the complex and sometimes difficult economic environment has had its effect on the information processing industry as it has on other Canadian industries. Nevertheless, there is a demand now, and it will escalate, for products and services that can help improve productivity.

Productivity growth will become as important a theme in our near future as fighting inflation has been in our recent past. Those companies and industries that come up with dynamic and innovative methods of achieving that specific goal will prosper. The current recession has brought home the necessity of running a lean, tough business in order to succeed, and productivity is central to that objective.

The information processing industries are central to our success in achieving productivity growth. Whether a company's business is in farming, mining, manufacturing, transportation or retailing, its management, marketing, distribution and other operating controls are basically office-centered, information-handling activities. As the number of blue-collar workers decreases, the proportion of white collar workers even in manufacturing organizations continues to increase. In virtually all commercial enterprises one finds executives, managers, clerks and secretaries; in most organizations there are also more specialized information workers, such as engineers, scientists, attorneys, salesmen, librarians, computer programmers and word processors. These people constitute the human-capital resources that can make an information-intensive economy viable.

It is in offices that the basic decisions are made that determine the cost-effectiveness of an entire organization. The office is the place where the timeliness of a decision or of a response can have immediate consequences. In today's competitive business environment, if the office is ineffective, the organization becomes ineffective.

The automation of office work is an essential element in the transformation of Canadian society to the so-called "information age". If new information technology is properly employed, it will enable organizations to decrease the delay and uncertainty brought about by the inaccessibility of information that is, for example, being typed, has been misfiled, or is even in the mail. It will reduce redundant work and unnecessary tasks and it will make better use of human resources for tasks that require judgement, initiative and rapid communication. It will enable faster and better decision-making that takes into account multiple, complex factors.

Your industry is in the forefront of technological change, and you are the first to see the effect of this change upon society. As I noted earlier, many people today are fearful of the new technologies and of the impact they will have on employment. Their apprehensions are valid, and the government, in cooperation with business and labour must take every possible action to ensure that the transition period to the new technologies is made with as little social upheaval as possible.

The commitment this government has made to technology and, perhaps even more importantly, to the management of technological change is evident.

Over \$700 million has been set aside in the Budget to provide support for technology development. This is in addition to the \$3 billion already budgeted in the 1983/84 estimates. It does not include the \$200 million in foregone tax revenues for current R&D expenditures, nor the \$185 million the new tax changes and proposals would add.

These funds are committed to support all aspects of technological development -- support to industry, and support for adjustment to the technological future.

We have the policy framework and we have the fiscal support. It is now up to each of us to take advantage of

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the technological opportunities at hand to build a strong economic foundation for our future.

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Towards 1990:

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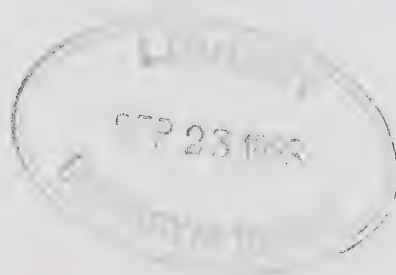
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Towards 1990:

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Foreword

Canada, along with the other industrialised nations of the world, stands on the frontier of a new era. This exciting future will be shaped by the technological advances of today.

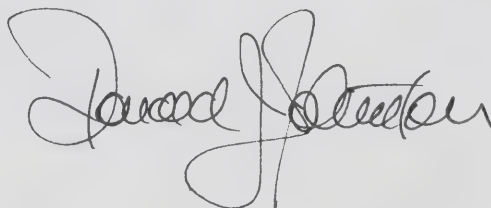
Canadians can be justifiably proud of this country's contributions to science and technology. We were the first country to operate a domestic communications satellite system and we have achieved an international reputation for excellence in remote sensing, space science and telecommunications. The dramatic performance of the Canadarm during the flight of the space shuttle Columbia is another Canadian success story.

The Government of Canada is determined to ensure that our tremendous technological potential is used to the maximum economic and social benefit of the country.

The working group on science and technology established at the June 1982 Summit Meeting in Versailles emphasized in its recent report the pervasive effects that science and technology are having on all our lives and called for greater awareness and planning for these changes by all governments. Canada was a part of this working group, and has been quick to respond to the challenges presented in the report.

The federal government has placed a high priority on bringing technology into the mainstream of economic policy development so that the benefits of existing and proposed technologies can make their maximum contribution to the future well-being of all Canadians.

A prosperous 1990 is only possible if we effectively use the opportunities of the 1980's.

A handwritten signature in black ink, reading "Donald Johnston". The signature is fluid and cursive, with the first name "Donald" and last name "Johnston" clearly distinguishable.

Donald J. Johnston
Minister of State
Economic Development
Science and Technology

A Technology Policy for Canada

What Policies Affect Technology Development?

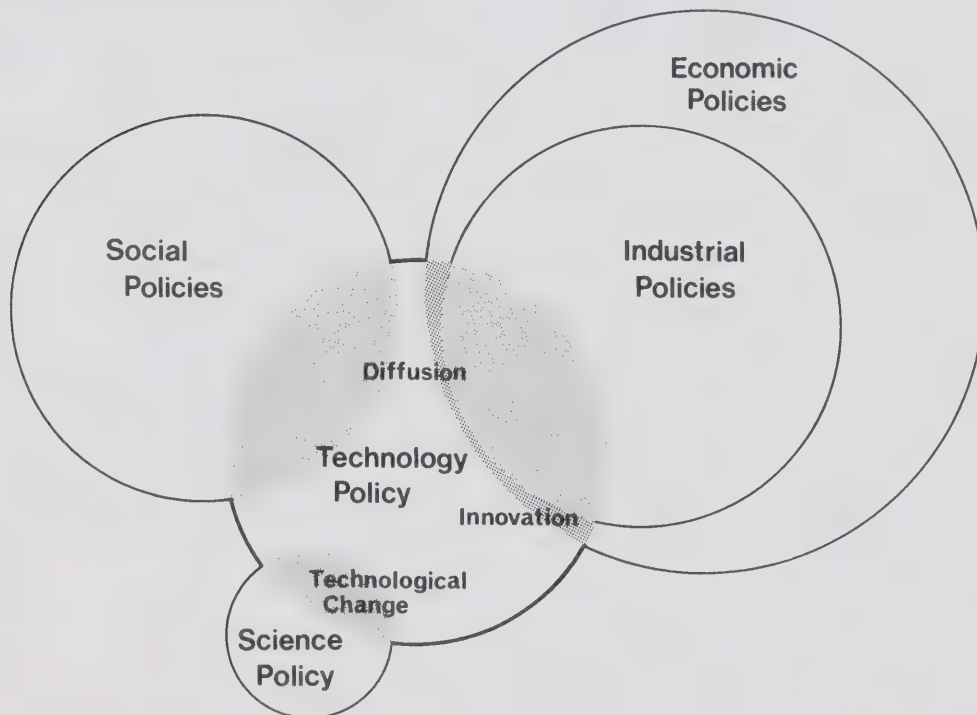
Technology policy concerns the development, application and diffusion of technical and scientific knowledge in the Canadian economy. One of the most important characteristics of such a policy is that *it cannot stand alone*.

Technology policy is related to both economic and industrial policies, and indeed it cannot be fully effective without this interdependence. Nor can it be separated from social policy as it also has an impact on employment, health, environment, lifestyle and other social issues.

Nor can technology policies be considered in isolation from science policies; the basic research fundamental to scientific progress has often provided the inspirational source for remarkable leaps in technological development.

The following diagram schematically simplifies these complex interrelationships.

Technology Policy Its Scope and Character



The diagram also highlights three central aspects of the role of technology in the economy:

technological change - which is the acquisition of new knowledge about methods to produce goods and services;

innovation - which is the introduction of these methods into the regular system of production of goods and services; and,

diffusion - which refers to the widespread adoption, purchase and use of new techniques or products.

These differing aspects of the role of technology in the economy emphasize the broad spectrum of issues which a comprehensive technology policy must address. Included in its scope are the research, development, design and marketing aspects of technology as well as scientific and engineering expertise. Equally important is the effect of technological change in workplace. The degree to which a technology policy is designed to particularly influence any one of these three aspects of technology development profoundly affects the character of the technology policy itself.

Technology and Economic Development

A technology-supported economic development strategy is the most effective route for Canada to follow to meet the challenges of the next decade. We will continue to have our resource strengths, but we have to choose whether to supplement them with technology or to use our scarce resources to support a growing list of non-viable industries. Only a technology-supported strategy will both provide us with a share of the new growth industries and allow our existing industries to remain fully competitive in world markets.

Economic forecasts are, for once, virtually unanimous in seeing the coming years as extremely competitive in terms of world markets. This is as true in the resource and service industries as it is in manufacturing.

The central ingredient in achieving and maintaining competitiveness is productivity.

Canada's productivity performance, compared with that of other countries in the Organization for Economic Cooperation and Development, has been steadily weakening over the past decade. Although we still enjoy overall productivity second only to the United States, our poor productivity growth in recent years, especially since 1973, has severely eroded our competitiveness.

The record of our productivity performance is illustrated in the following table which gives internationally comparative figures to 1980.

Table 1
Average Annual Percentage Change in Real GDP per
Person Employed; For Selected OECD Countries

Countries	1960/ 1980	1960/ 1967	1967/ 1973	1973/ 1980
Canada	1.7	2.5	2.9	0.0
United States	1.5	2.7	1.6	0.2
United Kingdom	2.2	2.4	3.4	1.1
France	4.1	5.0	4.7	2.6
West Germany	3.8	4.0	4.8	2.8
Japan	6.5	8.6	8.3	3.0

Source: OECD Economic Outlook, "Historical Statistics, 1960-1980".

The sources of growth in productivity are complex and poorly understood. Investment, management, industrial relations and skills training all have key roles to play. However, in today's industrialized world, no ingredient of productivity growth is more important than technology.

Objectives for a Technology Policy

Within the fast-paced environment of technological development, national objectives have an important role to play.

Such objectives focus our efforts on the longer term economic goals that can be achieved through increased management of technological change. They also provide guidelines for the policy decisions that must be taken by the federal government to achieve our technological potential. At the same time they ensure that the benefits of technological change are shared equitably by all Canadians. The federal government has established objectives for a technology policy for Canada within the context of its role *vis-à-vis* the other sectors.

The general objectives of the federal technology policy are:

- To strengthen the Canadian economy through the development of new technologies for producing goods and services and the widespread adoption of new and existing technologies;

- To manage the process of technological development so as to ensure that Canadians are aware of both the opportunities and the problems that might arise;

- To ensure that the benefits of technology development are shared equitably among all Canadians in every region; and,

- To create a social climate that places a premium on scientific and technological excellence, curiosity and innovation.

In addition to these broad objectives, the federal government has set for itself more detailed objectives in relation to the other sectors involved in technology development.

The Business Sector

The objectives relating to the business sector reflect the primacy of the private sector in initiating innovation and new investment, and relate primarily to providing support to the private sector. These are:

- To continue to provide an overall business environment that encourages investment, innovation and enterprise;

- To ensure that the current industrial support programs for technology development are working as effectively as possible towards achieving economic and technological objectives;

- To ensure that firms operating in Canada are aware of, have simple access to, and apply the most productive technologies available to ensure their continuing competitiveness;

- To ensure the development of internationally competitive high technology industries in Canada, suited to our knowledge base, resource base, and industrial structure; and,

- To ensure that industry is able to obtain the best possible information with regard to technological forecasting and assessment.

The University Sector

Within the context of the university sector's traditional functions, which are to acquire, store and transmit knowledge, the objectives relating to the university sector are:

- To create a core of excellence within the university structure that undertakes research relevant to industry;
- To form the research manpower required to meet the objectives of the technology policy;
- To increase the responsiveness of universities to the research and technology of industry; and
- To make industry more aware of the contributions which universities can make to the process of technology development.

The Labour Sector

With respect to the labour sector the objectives are:

- To encourage labour-management mechanisms both at the level of the firm and at industry and national levels that will permit joint planning with respect to technological change; and
- To support labour in studying the issues brought about by technological change and in educating both organized and unorganized labour, and in particular women workers, and the general public on these matters from a labour perspective.

The Government Sector

With respect to the research and technology development performed or funded by the government sector itself, the objectives are:

- To ensure that all federal programs and policies related to technology development contribute as effectively as possible to overall federal objectives for technology and economic development;
- To ensure that research undertaken in federal laboratories in support of technology development is relevant to industrial requirements and compatible with the stated economic objectives; and
- To ensure that Canada develops and maintains a national competence in the research and development necessary for technology development.

The Provinces

The federal government intends to work with the provincial governments:

- To achieve harmonization of technology related policies and programs; and
- To provide an environment which encourages interprovincial cooperation.

Social Issues and Human Resources

To support individuals and institutions in responding to the changes, challenges and opportunities posed by technological development, the federal government has set the following objectives:

To ensure that all Canadians are aware of the implications of technological change on their lives;

To anticipate the impact of technological change, and to minimize its negative impacts, in close consultation with those most likely to be affected, particularly working Canadians whose jobs may be threatened;

To provide access to the training and educational opportunities that will help individuals take advantage of new opportunities; and

To ensure that individuals in all regions of the nation have similar ranges of opportunity, and that all regional economies take advantage of technological opportunities in line with their comparative advantages.

Implementation of the Policy

Sub-Committee on Technology Development

A policy for technology development will only be effective if it is implemented through a broad spectrum of economic, social and science policies. To accomplish this, the Prime Minister has established a special Sub-Committee of Cabinet chaired by the Minister of State for Science and Technology and for Economic Development to deal with all matters concerning technology development. This group of Ministers, and their supporting federal officials, are dedicated to achieving our technology-supported economic development strategy. Because of their departmental mandates, they also have the power, resources and influence to bring about change, not only through establishing new programs, but also through adapting existing ones.

This organizational initiative will integrate the critical technology development decisions in all the policy areas which are important to the effective mobilization of our technology resources.

The Sub-Committee on Technology Development provides a vital policy link which will be demonstrated through increased coordination of the federal incentives which encourage research and technology development in both the university and the business sectors. It also provides the opportunity to better mesh research currently undertaken in the federal government for technology development with our national industrial development.

The Sub-Committee on Technology Development will also assess the social impact of technological growth and initiate programs to ease the negative aspects of technological change on our social environment.

Current Federal Support to Technological Development

The federal government supports technology development through research and development within its departments and agencies and also through incentives provided to the industry and university sectors and through contracts for procurement of high technology goods or research itself.

In 1983/84, the federal government will be spending \$3.0 billion on the natural and human sciences in Canada.

Federal funding of science and technology activities performed in the university and industry sectors is budgeted at over \$1.0 billion for this next fiscal year. This does not include the tax incentives which, in terms of foregone federal revenue, are estimated to benefit industry by over \$200 million.

Federal incentives for technology development range from tax incentives, to grants and contributions, to direct technical assistance, to government procurement, and to labour adjustment programs. Each of these forms of assistance is designed to support a particular aspect of technology development.

For example, research and development tax incentives are fiscal policy measures which help improve the risk ratio for technology investment for companies with sufficient cash flow. Smaller companies in more urgent need of cash flow to support R&D investment are assisted through direct financial incentives which are closely related to other industrial policy measures.

The federal government is concerned with the effective delivery of the programs in support of technology development and through the Sub-Committee on Technology Development intends to review the "mix" of programs regularly to ensure the scope of support for technology development is adequate.

The current programs and incentives are described in the publication "The Government of Canada's Support for Technology Development".

New Initiatives—The Budget

Tax Incentives

Although Canadian tax incentives for research and development are among the richest in the world, the federal government, in response to requests from industry, has proposed improvements to these incentives to enhance the ability of firms, particularly smaller ones, to benefit from them. These changes would make the incentives simpler and more effective, and allow R&D performing firms to use tax incentives to attract outside financing.

The first proposal is to replace the current 50 percent deduction for incremental R&D expenditures—increases above a firm's three-year average—with a 10 percentage point increase in the present tax credit applying to all R&D. This would double the base rate of R&D tax credit from 10 % to 20 %, while the rate in the Atlantic provinces and the Gaspé would rise from 20 % to 30 %. Small business corporations would be eligible for a 35 % R&D tax credit.

The second proposal recommends a flexible mechanism which would allow R&D companies to attract new investors. Under an agreement with the investor, the R&D performing corporation would renounce the benefits of R&D tax deductions and credits, and in turn, the investor would be eligible for a special 50 % tax credit for funds invested.

The April 19 Budget also outlined changes in the existing federal investment tax credits which apply to R&D tax incentives. The Budget increased the carry-forward and carry-back provisions to 7 years and 3 years respectively, and also proposed that a portion of the tax credit earned between the Budget date and June 30, 1986, could be refundable. These portions would be 40 % for small or unincorporated firms and 20 % for others.

The R&D tax proposals would add \$100 million to the current level of support. In addition, the general budget measures will provide \$85 million of further tax support for companies specializing in the R&D field.

Improved Research Facilities

Under the Special Recovery Capital Projects Program, which was announced in the April 19 Budget, research and training facilities critical to mastering new technologies will receive accelerated funding totalling \$290 million over the next four years. Fifteen new facilities will be built in all parts of Canada over the next four years. In addition, approximately \$180 million will be allocated for high technology procurement.

Human Resource Development

To take full advantage of the opportunities offered by technological change, Canada will increasingly need well-educated and well-trained workers. Moreover, workers will have to acquire new skills and knowledge throughout their working lives. The federal government is allocating an additional \$155 million for human resource development programs. This will bring to \$1.2 billion this year the funds allocated for skills development in occupations that are significant for economic growth. Over 250,000 Canadians, half of them young people, will benefit this year from federal support for human resource development. In addition, funding under the Canada Student Loans Act will be expanded by \$60 million to \$141 million this year.

Other New Initiatives

Several other new initiatives to foster technology development in Canada have been undertaken by the federal government on the recommendation of the Sub-Committee on Technology Development. These are the first of a number of proposals the Sub-Committee will be considering.

Each initiative supports the objectives of the Technology Policy, and encourages the various sectors within the economy to work and plan in close cooperation.

The total costs of these new initiatives will be \$100 million over the next two years.

Productivity and Technological Adjustment

A broad national effort in the years ahead will ensure that Canada remains one of the most productive, prosperous and competitive economies in the industrialized world. To encourage concerted action in areas of mutual concern, the federal government will consult with labour unions and business organizations to launch a national drive towards higher productivity and employment growth. The first task of these consulta-

tions is to establish a founding committee for a *national centre for productivity and employment growth*. The founding committee will be asked to recommend an appropriate name, mandate, structure and mode of operation for the centre.

Regional Support

The federal government is providing additional funding for regional technology development through expansion of the National Research Council's *Industrial Research Assistance Program*. In particular, the *Field Advisory Service* and the *Technical Information Service* will expand their current services to small and medium sized businesses. These programs provide technical information and advice to help solve manufacturing problems, to improve productivity and to promote the use of research results in industry.

The federal government is also strengthening its support of *joint university/industry technology research* efforts.

The objectives of this support are:

- to generate and maintain a core program in a field of specialization and to develop new technologies;
- to train the research manpower required by industry in the development and application of advanced technologies and to teach postgraduate courses; and,
- to perform specific R&D for participating industries, carry out joint research programs with industry, and perform contract research.

Potential fields of operation include microelectronics, artificial intelligence, biotechnology, materials research, manufacturing technologies, and space technologies.

University Support

Universities provide a valuable base for technology development through their fundamental research and their training of skilled researchers and manpower for technological expansion. The federal government will support university research through increased funding to the Natural Sciences and Engineering Research Council. The Council is the largest single funder of university-based research in Canada. Continued support for the Council's Five-Year Plan will encourage continued expansion of research training and research support programs and allow the Council to launch the new programs required to train the specialists needed to meet Canada's objectives for research and technological development.

Microelectronics

The federal government will be establishing a *National Microelectronics Design Network* comprising a nation-wide, university-based, computer-linked network of design and testing stations for Very Large Scale Integrated Circuits (VLSI).

The design network is an extension of a project currently supported by the Natural Sciences and Engineering Research Council in conjunction with Queen's University and Northern Telecom Canada Ltd. Through a coordination centre at Queen's University, ten Canadian universities are now submitting chip designs to Northern Telecom for fabrication free of charge. The fabricated chips are subsequently returned to the universities for testing and use in experimental systems.

About thirty universities are expected to participate in the expanded design network. These facilities will help provide the trained and experienced manpower which is critical to the expansion of the Canadian microelectronics industry. Enhanced collaboration between industry and Canadian universities as well as opportunities for the exploitation of software research will also result from this initiative.

Biotechnology

Biotechnology is one of the most important emerging technologies. Advances in biotechnology will radically transform both products and processes in the energy, food, drugs, chemicals, plastics, mining and agriculture industries.

To help ensure that Canada fully benefits from this technology, the federal government has endorsed a *National Biotechnology Strategy* which, as its first priority, will be establishing research networks in government, university and industry and concentrating efforts in areas of critical importance to Canada's economic future. The federal government will encourage strong cooperation between university and industry by matching all industrial contributions with federal funds. These networks will be focussed on improving the use of Canada's resource base and on industrial development.

A Biotechnology Advisory Committee will also be established to advise the Minister of State for Science and Technology and for Economic Development on all matters related to biotechnology, including the means to improve the effectiveness of the strategy as new frontiers in technological development are forged.

Communications

Canada is a world leader in communications technology. To further develop our strength in this area, the federal government is proposing the creation of a Canadian Communications, Informatics and Space Research and Development Institute. As a non-profit corporation, it would conduct research and development in the allied fields of telecommunications, space technology, informatics and computer sciences. A Task Force, headed by the Minister of Communications, will assess the viability of the proposed institute.

Public Awareness

We are entering a technological era when most career and day-to-day activities directly involve working with, understanding and living comfortably with science, mathematics and technology. A growing number of personal, public and professional decisions require awareness and familiarity with the activities, principles and methods of science and technology. A better understanding and familiarity with science and technology can help us:

- Encourage our youth to enter fields of scientific study so we can develop the highly skilled scientists, engineers and technicians we require to develop our technological potential;

- Encourage people in the labour force to watch for and welcome retraining opportunities in areas of technological change;

Develop managers and decision makers who understand the nature and implications of technological development and more readily make the required adjustments; and

Encourage citizens to follow and weigh the progress and implications of science and technology.

The federal government is establishing a fund to promote the public awareness and understanding of science and technology and of the impact developments in this area will have on the Canadian economic and social environment.

fonds du fédéral à toutes les contributions de l'industrie. Ces réseaux concentreront leurs efforts sur l'amélioration à apporter à l'utilisation de l'assise de ressources du Canada et sur l'expansion industrielle.

Un Comité consultatif sur la biotechnologie sera institué afin de conseiller le ministre d'Etat chargé des Sciences et de la Technologie et du Développement économique sur toutes les questions se rapportant à la biotechnologie, y compris les moyens d'améliorer l'efficacité de la stratégie à mesure que se dessinent les nouvelles frontières du développement technologique.

Communications

Au niveau mondial, le Canada est un chef de file en technologie des communications. Afin d'accroître notre force dans ce domaine, le gouvernement fédéral a proposé la création d'un institut canadien de recherche et de développement en communications, en informatique et en technologie spatiale. Propriété du gouvernement fédéral et organisme sans but lucratif, la société sera chargée de mener des travaux de recherche et de développement dans les domaines connexes des télécommunications, des techniques spatiales et de l'informatique. Un Groupe de travail, présidé par le Ministre des Communications, évaluera la viabilité de l'institut proposé.

La sensibilisation du public

Nous entrons dans une ère technologique où la plupart des carrières et des activités quotidiennes impliquent directement qu'on travaille et qu'on vive confortablement dans le monde des sciences, des mathématiques et de la technologie, et qu'on le comprenne. Un nombre croissant de décisions personnelles, publiques et professionnelles exigent une sensibilisation et une familiarité avec les activités, les principes et les méthodes scientifiques et technologiques. Si l'incapacité à comprendre les sciences et la technologie engendre la crainte, le ressentiment et une résistance aux changements technologiques, une meilleure compréhension et une plus grande familiarité avec les sciences peuvent nous aider à :

encourager les jeunes gens à étudier dans les domaines scientifiques afin que nous puissions obtenir les scientifiques, les ingénieurs et les techniciens hautement qualifiés dont nous avons besoin pour développer notre potentiel technologique;

encourager la main-d'œuvre à surveiller et à accueillir les occasions de réorientation dans de nouveaux domaines de la technologie;

former des gestionnaires et des décisionnaires qui comprendront la nature et les implications du développement technologique et qui pourront s'adapter plus rapidement aux changements;

encourager la population à suivre et apprécier le progrès et les implications scientifiques et technologiques.

Le gouvernement fédéral va créer un fonds destiné à promouvoir la sensibilisation et la compréhension du public quant à la science et à la technologie et quant à leur effet sur les milieux sociaux et économiques canadiens.

Les domaines de travaux possibles comprennent: la micro-électronique, l'intelligence artificielle, la biotechnologie, la recherche sur les matériaux, les techniques de fabrication et les techniques spatiales.

Appui aux universités

Les universités constituent une source précieuse de développement technologique grâce à leurs capacités en recherche fondamentale et en formation de chercheurs et de main-d'œuvre hautement qualifiés en vue du développement technologique. Le gouvernement fédéral appuiera la recherche universitaire au moyen d'un financement accru du Conseil de recherches en sciences naturelles et en génie. Le Conseil est actuellement le principal bailleur de fonds de la recherche universitaire au Canada et un appui accéléré au cours des quatrième et cinquième années de son plan quinquennal lui permettra de continuer à étendre sa formation en recherche et ses programmes d'appui à la recherche. Cette mesure lui permettra également de lancer les nouveaux programmes nécessaires à la formation des spécialistes dont le Canada a besoin pour atteindre ses objectifs de recherche-développement technologique.

Micro-électronique

Le gouvernement fédéral mettra sur pied à partir des universités, un *réseau national de conception micro-électronique*, englobant un réseau national informatisé de conception et de stations d'essais à intégration sur très grande échelle (ITGE).

Le réseau de conception est la suite de travaux présentement appuyés par le Conseil de recherches en sciences naturelles et en génie, en collaboration avec l'Université Queen et Northern Telecom Canada Ltd. Par l'intermédiaire d'un centre de coordination à l'Université Queen, dix universités canadiennes présentent maintenant à Northern Telecom des microplaquettes que cette société fabrique pour elles sans frais. Par la suite, les microplaquettes sont renvoyées aux universités qui les vérifient et les utilisent dans des systèmes expérimentaux.

On prévoit que 30 universités participeront au réseau étendu de conception. Ces installations aideront à former la main-d'œuvre expérimentée qui est essentielle à l'expansion de l'industrie canadienne de micro-électronique. Cette initiative entrainera également une amélioration de la collaboration entre l'industrie et les universités canadiennes de même qu'elle devrait offrir des possibilités au niveau de la recherche logicielle.

Biotechnologie

La biotechnologie est une des technologies naissantes les plus importantes. Les progrès de la biotechnologie transformeront radicalement et les produits et les méthodes des industries énergétique, pharmaceutique, chimique, plastique, minière et agricole. Afin d'assurer au Canada les avantages complets de cette technologie, le gouvernement fédéral a approuvé une *stratégie nationale en biotechnologie*, dont la priorité sera de créer des réseaux de recherche au gouvernement, dans les universités et dans l'industrie, qui feront porter les efforts dans les domaines de première importance pour l'avenir économique du Canada. Le gouvernement fédéral encouragera une coopération étroite entre l'université et l'industrie en ajoutant l'équivalent en

Autres initiatives nouvelles

Le gouvernement fédéral, suite à la recommandation du Sous-comité au développement technologique, a pris plusieurs initiatives pour stimuler le développement économique au Canada. Voici quelques-unes d'un ensemble de propositions que le Sous-comité examinera.

Chaque initiative appuie fermement la poursuite des objectifs de la politique technologique et met un accent vigoureux sur l'encouragement à apporter aux divers secteurs de l'économie afin qu'ils travaillent en étroite collaboration.

On prévoit que les coûts liés à ces nouvelles initiatives s'élèveront à environ 100 millions de dollars pour une période de deux ans.

La productivité et l'adaptation technologique

Il convient de lancer un vaste effort national au cours des prochaines années afin de s'assurer que le Canada continue d'être un des pays industrialisés les plus productifs, prospères et concurrentiels sur le plan économique. En reconnaissance de la nécessité pour la main-d'œuvre et le milieu des affaires d'adopter une action concertée dans des domaines de préoccupation mutuelle, le gouvernement fédéral a l'intention d'établir des consultations avec les syndicats de la main-d'œuvre et des organismes commerciaux afin de lancer une poussée nationale de productivité accrue et de croissance de l'emploi. Un des buts premiers de ces consultations est la mise sur pied d'un comité fondateur pour un *Centre national de productivité et de croissance de l'emploi*. On demandera au comité fondateur de recommander une désignation, un mandat, une structure et une mode de fonctionnement pertinents pour le centre.

Appui régional

Le gouvernement fédéral fournit des fonds supplémentaires au développement technologique régional en étendant le Programme d'aide à la recherche industrielle du Conseil national de recherches. Le Service de consultations régionales et le Service d'information technique seront étendus pour offrir leurs services aux petites et moyennes entreprises partout au Canada. Ces programmes fournissent l'information et les conseils techniques susceptibles de leur permettre de résoudre des problèmes de fabrication, d'améliorer la productivité et de promouvoir l'utilisation des résultats de recherche dans l'industrie.

Le gouvernement fédéral raffermira également son appui aux efforts conjoints de recherche technologique universités-industrie.

Les objectifs de cet appui consistent à:

- élaborer et soutenir un programme clé dans un domaine de spécialisation et mettre au point de nouvelles techniques,
- former la main-d'œuvre de recherche nécessaire à l'industrie dans la mise au point et l'application des techniques de pointe et dispenser de l'enseignement de troisième cycle, et
- effectuer de la R-D déterminée pour les industries participantes, administrer des programmes conjoints de recherche avec l'industrie et exécuter de la recherche contractuelle.

La première proposition consiste à remplacer la déduction actuelle de 50 p. 100 pour l'augmentation des dépenses de R-D — hausses au delà de la moyenne d'une entreprise sur trois ans — par un 10 p. 100 supplémentaire ajouté au crédit d'impôt actuel qui s'applique à toute la R-D. Cela doublerait le taux de base du crédit d'impôt à la R-D qui passerait de 10 à 20 p. 100, alors que le taux applicable dans les provinces de l'Atlantique et la région de Gaspé passerait de 20 à 30 p. 100 et que les sociétés commerciales seraient admissibles à un crédit d'impôt à la R-D de 35 p. 100.

La deuxième proposition recommande un mécanisme souple destiné à permettre aux sociétés de R-D d'attirer de nouveaux investisseurs. En vertu d'une entente avec l'investisseur, la société qui exécute de la R-D renoncerait aux avantages des déductions et crédits d'impôt à la R-D auxquels elle aurait normalement droit et, en retour, l'investisseur serait admissible à un crédit d'impôt spécial de 50 p. 100 sur les fonds investis.

Le budget du 19 avril a également décrit les changements dans les crédits d'impôt fédéral à l'investissement qui existent présentement et qui s'appliquent aux stimulateurs fiscaux à la R-D. Le budget a augmenté à trois et sept ans respectivement les mesures de report prospectif et de report rétrospectif et a proposé aussi qu'une partie du crédit d'impôt gagné entre la date du budget et le 30 juin 1986 puisse être remboursable. Ces parts seraient de 40 p. 100 pour les petites sociétés ou pour les entreprises non constituées en société, et 20 p. 100 pour les autres.

Ces propositions fiscales à la R-D ajouteraient 100 millions de dollars à l'aide fiscale maintenant disponible. Cela s'ajouterait aux mesures générales du budget qui offrent 85 millions de dollars de plus d'aide fiscale aux sociétés spécialisées en R-D.

Amélioration des installations de recherches

En vertu du Programme spécial de relance des investissements annoncé dans le budget du 19 avril, les installations de recherches et de formation d'extrême importance dans la maîtrise des techniques nouvelles recevront un financement accéléré de 290 millions de dollars au cours des quatre prochaines années. Quinze nouveaux centres seront constitués à travers le Canada au cours de cette même période. De plus, encore 180 millions de dollars seront consacrés à l'acquisition de techniques de pointe.

Développement des ressources humaines

Afin de tirer avantage des possibilités offertes par le changement technologique, le Canada aura de plus en plus besoin de travailleurs détenant une instruction et une formation pertinentes. De plus, les travailleurs devront acquérir de nouvelles compétences et de nouvelles connaissances tout au long de leur vie active. Le gouvernement fédéral consacre une somme supplémentaire de 155 millions de dollars aux programmes de développement des ressources humaines. Les fonds consacrés au développement des aptitudes dans les domaines d'emploi importants pour la croissance économique atteindront ainsi 1,2 milliard de dollars cette année. Plus de 250,000 Canadiens, dont la moitié sont des jeunes, bénéficieront cette année de l'appui fédéral au développement des ressources humaines. De plus, le financement en vertu de la Loi canadienne sur les prêts aux étudiants sera augmenté de 60 millions de dollars pour atteindre 141 millions de dollars cette année.

Appui actuel du gouvernement fédéral au développement technologique

Le gouvernement fédéral appuie le développement technologique par la recherche-développement, à l'intérieur de ses ministères et organismes et également par l'intermédiaire de stimulateurs offerts à l'industrie et au secteur universitaire, de même que par les contrats d'approvisionnement en biens de technique de pointe ou de recherche même.

En 1983-1984, le gouvernement fédéral dépensera 3 milliards de dollars en sciences naturelles et en sciences humaines au Canada.

Le financement fédéral des activités de science et de technologie qui ont cours dans les universités et dans le secteur de l'industrie s'inscrit à plus d'un milliard de dollars au budget de la prochaine année financière. Cela ne comprend pas les stimulateurs fiscaux qui, en termes de revenu fédéral manquant, sont évalués à plus de 200 millions de dollars au profit de l'industrie.

Les mesures incitatives fédérales au développement technologique comprennent des stimulateurs fiscaux, des subventions et des contributions, une aide technique directe et l'appui par le biais de l'acquisition gouvernementale et les programmes d'adaptation de la main-d'œuvre. Chaque forme d'appui vise à encourager un aspect précis du développement technologique.

Par exemple, les stimulateurs fiscaux de la recherche-développement sont des mesures de politique fiscale qui visent à améliorer la proportion de risque liée à l'investissement technologique pour les entreprises dont le cash-flow est suffisant. Les entreprises plus petites ayant un besoin plus urgent d'argent comptant afin d'appuyer l'investissement en R-D sont appuyées par le biais de stimulateurs financiers directs lesquels sont étroitement liés aux autres mesures de politique industrielle.

Le gouvernement fédéral se préoccupe de l'efficacité des programmes appuyant le développement technologique. Par l'intermédiaire du Sous-comité au développement technologique, il se propose de réviser régulièrement la gamme de programmes afin de s'assurer que l'importance de l'appui au développement technologique est suffisante.

Les programmes et les stimulateurs actuels sont décrits de façon détaillée dans la publication « L'appui du gouvernement du Canada au développement technologique ».

Nouvelles initiatives—Le budget

Les stimulateurs fiscaux

Malgré le fait que les stimulateurs fiscaux canadiens comptent parmi les plus intéressants au monde, le gouvernement fédéral, suite aux demandes de l'industrie, a posé des améliorations à ces stimulateurs, afin d'augmenter la capacité des entreprises, surtout celle des petites entreprises, à en tirer profit. Ces changements simplifieraient les stimulateurs et en amélioreraient l'efficacité. Ils permettraient également aux entreprises exécutant de la R-D d'utiliser les stimulateurs fiscaux aux fins d'attirer des fonds de l'extérieur.

Les questions sociales et les ressources humaines

Afin d'aider les individus et les institutions à s'adapter aux changements, aux défis et aux possibilités que soulève l'évolution technologique, le gouvernement a fixé les objectifs suivants:

faire en sorte que tous les Canadiens soient conscients des implications de l'évolution technologique pour leur vie;

prévoir les conséquences de l'évolution technologique, en consultation étroite avec ceux qui risquent davantage d'être touchés, surtout les travailleurs canadiens dont les emplois sont menacés et limiter ses effets négatifs;

rendre accessibles la formation et les possibilités éducatives qui permettront aux individus de profiter des possibilités nouvelles; et

faire en sorte que les gens de toutes les régions du pays aient des niveaux comparables de possibilités et que toutes les économies régionales profitent des possibilités techniques selon leurs avantages relatifs.

Mise en œuvre de la politique

Le Sous-comité au développement technologique

Une politique de développement technologique ne sera efficace que si elle fait partie d'une importante gamme de politiques économiques, scientifiques et sociales. À cet effet, le Premier ministre a mis sur pied un Sous-comité spécial du Cabinet, présidé par le ministre d'État chargé des Sciences et de la Technologie et du Développement économique, afin de traiter de toutes les questions se rapportant au développement technologique. Ce groupe de ministres, et leurs fonctionnaires fédéraux à l'appui, consacrent leurs efforts à l'application de notre stratégie de développement économique appuyée sur la technologie. En raison de leur mandat ministériel, ils possèdent le pouvoir, les ressources et l'influence nécessaires pour apporter des changements, non seulement par la création de nouveaux programmes, mais aussi par la transformation des programmes en cours.

Cette initiative organisationnelle permettra d'intégrer les décisions essentielles en matière de développement technologique, dans tous les domaines de politique qui importent à la mobilisation efficace de nos ressources technologiques.

Le Sous-comité au développement technologique sert de lien politique essentiel qui sera illustré par une coordination des stimulants fédéraux destinés à encourager l'expansion de la recherche et de la technologie à la fois dans le secteur universitaire et dans le monde des affaires. Il fournit également la possibilité de mieux intégrer la recherche, présentement entreprise au gouvernement fédéral en vue du développement technologique, à l'expansion industrielle nationale.

Le Sous-comité au développement technologique évaluera également les conséquences sociales de la croissance technologique et suscitera des programmes qui atténueront les aspects négatifs de l'évolution technologique dans notre milieu social.

Le secteur universitaire

Dans le contexte des tâches traditionnelles du secteur universitaire, qui sont d'acquies-
rir, de conserver et de transmettre des connaissances, les objectifs dans ce domaine
consistent à:

créer un noyau d'excellence dans la structure universitaire qui assure la recher-
che utile à l'industrie;
former le personnel de recherche nécessaire à la poursuite des objectifs de la
politique technologique;
intensifier la réaction des universités à la recherche et à la technologie de
l'industrie;

rendre l'industrie plus consciente de la contribution que les universités peuvent
faire au processus de développement technologique.

Le secteur de la main-d'œuvre

En ce qui a trait au secteur de la main-d'œuvre, les objectifs sont:

d'encourager les échanges tant au niveau de l'entreprise qu'à celui de l'indus-
trie et du pays, entre la main-d'œuvre et la gestion qui permettront une planifi-
cation conjointe, par rapport à l'évolution technologique; et
d'appuyer la main-d'œuvre dans l'étude des questions que soulève l'évolution
technologique et dans la formation de la main-d'œuvre syndiquée et non syndi-
quée, en particulier féminine, et du grand public sur ces questions, à partir du
point de vue ouvrier.

Le secteur gouvernemental

En ce qui a trait à la recherche-développement technologique réalisée ou financée
par le secteur gouvernemental même, les objectifs consistent à:

faire en sorte que tous les programmes et politiques du fédéral se rapportant au
progrès technique contribuent aussi efficacement que possible aux objectifs
fédéraux globaux pour le développement économique et technologique;
à s'assurer que la recherche entreprise dans les laboratoires fédéraux à l'appui
du développement technologique soit conforme aux besoins de l'industrie et
compatible avec les objectifs économiques indiqués; et
à faire en sorte que le Canada développe et conserve une compétence natio-
nale de recherche-développement nécessaire au progrès technique.

Les provinces

Le gouvernement fédéral se propose de travailler avec les gouvernements provin-
ciaux en vue:

d'harmoniser les politiques et les programmes reliés à la technologie; et
d'offrir un climat qui encourage la coopération interprovinciale.

Les objectifs de la politique technologique

Dans ce milieu de développement technologique qui évolue si rapidement, les objectifs nationaux ont un rôle important à jouer.

Ils permettent à tous les secteurs de concentrer leurs efforts sur les buts économiques à long terme qui peuvent être atteints par une gestion plus poussée de l'évolution technologique. Ils servent également de lignes directrices pour les décisions en matière de politique que le gouvernement fédéral doit prendre afin d'exploiter notre potentiel technologique tout en permettant de faire en sorte que les avantages des progrès techniques soient répartis équitablement entre tous les Canadiens. Le gouvernement fédéral a fixé des objectifs de politique technologique pour le Canada dans le contexte de son rôle par rapport aux autres secteurs.

Les objectifs généraux de la politique technologique fédérale sont de :

raffermir l'économie canadienne par la mise au point de techniques nouvelles de production de biens et services et par l'adoption généralisée de techniques nouvelles ou existantes;

diriger le processus de développement technologique en s'assurant que les Canadiens soient conscients à la fois des possibilités et des problèmes qui peuvent survenir;

faire en sorte que les avantages du développement technologique soient répartis équitablement entre tous les Canadiens de toutes les régions; et

créer un climat social qui accorde de l'importance à l'excellence scientifique et technique, à la curiosité et à l'innovation.

En plus de ces objectifs généraux, le gouvernement fédéral s'est fixé lui-même des objectifs plus détaillés en rapport avec les autres secteurs intervenant dans le développement technologique.

Le monde des affaires

Les objectifs dans ce domaine reflètent la primauté du secteur privé à susciter l'innovation et l'investissement et se rattachent d'abord à l'aide à offrir au secteur privé. Ils consistent à :

continuer à offrir au monde des affaires, un climat qui encourage l'investissement, l'innovation et l'entreprise;

faire en sorte que les programmes actuels d'aide à l'industrie pour le développement technologique fonctionnent aussi efficacement que possible par rapport aux objectifs économiques et technologiques fixés;

faire en sorte que les entreprises oeuvrant au Canada connaissent les techniques les plus efficaces disponibles, qu'elles y aient facilement accès et qu'elles s'en servent pour assurer leur compétitivité permanente;

assurer le développement, au Canada, d'industries de technique de pointe concurrentielles sur le plan international et adaptées à nos connaissances, à notre assise de ressources et à notre structure industrielle; et

faire en sorte que l'industrie puisse disposer de la meilleure information possible quant aux prévisions et à l'évaluation techniques.

Tableau 1
Changement de pourcentage annuel moyen du PNB réel
par employé; pour les pays sélectionnés membres de
l'OCDE

Pays	1960-1980	1960-1967	1967-1973	1973-1980
Canada	1,7	2,5	2,9	0,0
Etats-Unis	1,5	2,7	1,6	0,2
Royaume-Uni	2,2	2,4	3,4	1,1
France	4,1	5,0	4,7	2,6
Allemagne de l'Ouest	3,8	4,0	4,8	2,8
Japon	6,5	8,6	8,3	3,0

Source: Vue d'ensemble économique de l'OCDE, « Statistiques historiques, 1960-1980 ».

Les sources d'accroissement de la productivité sont complexes et mal comprises. L'investissement, la gestion, les relations industrielles, la formation etc. ont tous des rôles essentiels à jouer. Toutefois, dans notre monde industrialisé, rien n'est plus important que la technologie dans la croissance de la productivité.

Le diagramme met également en lumière trois aspects centraux du rôle de la technologie dans l'économie;

les changements technologiques: l'acquisition de connaissances nouvelles concernant les modes de production de biens et services;

l'innovation: l'adoption de ces nouveaux modes par le système habituel de production de biens et services;

la diffusion: le choix, l'achat et l'utilisation généralisés de ces techniques et produits.

Ces aspects variés du rôle de la technologie dans l'économie mettent l'accent sur le grand nombre de questions qui doivent faire partie d'une politique technologique complète. La recherche, le développement, les aspects de conception et de commercialisation font partie de cet éventail, tout comme la compétence en science et en génie. Sont également importantes, les conséquences de l'évolution technologique dans les milieux de travail. La mesure avec laquelle une politique technologique conçue pour influencer l'un quelconque de ces trois aspects particuliers de développement technologique affecte profondément le caractère même de la politique technologique.

Technologie et développement économique

La meilleure voie à suivre, si le Canada veut répondre aux défis de la prochaine décennie, réside dans une stratégie de développement économique appuyée sur la technologie. Nous continuerons de profiter de la force de nos ressources mais nous devons choisir entre la compléter à l'aide de la technologie ou utiliser nos faibles ressources pour aider un nombre de plus en plus grand d'industries non viables. Seule une stratégie appuyée sur la technologie nous apportera une part des industries nouvelles et permettra aux industries existantes de demeurer pleinement concurrentielles sur les marchés mondiaux.

Les prévisions économiques sont, pour une fois, pratiquement unanimes à considérer les prochaines années comme extrêmement marquées par la concurrence en termes de marchés mondiaux. Cela est aussi vrai pour les industries de ressources, et pour les services, que pour la fabrication.

La productivité est l'élément central pour devenir concurrentiel et le demeurer.

Si on la compare à celle d'autres pays de l'Organisation de Coopération et de Développement économique, la performance du Canada en ce qui a trait à la productivité, s'est affaiblie progressivement au cours de la dernière décennie. Malgré le fait que nous nous classions encore deuxième, après les États-Unis, quant à l'ensemble de la productivité, la faible croissance de notre productivité des dernières années, surtout depuis 1973, a sérieusement miné notre compétitivité.

Le tableau suivant illustre le détail de notre performance quant à la productivité, à partir de données comparatives internationales jusqu'à 1980.

Une politique technologique pour le Canada

Quelles politiques affectent le développement technologique?

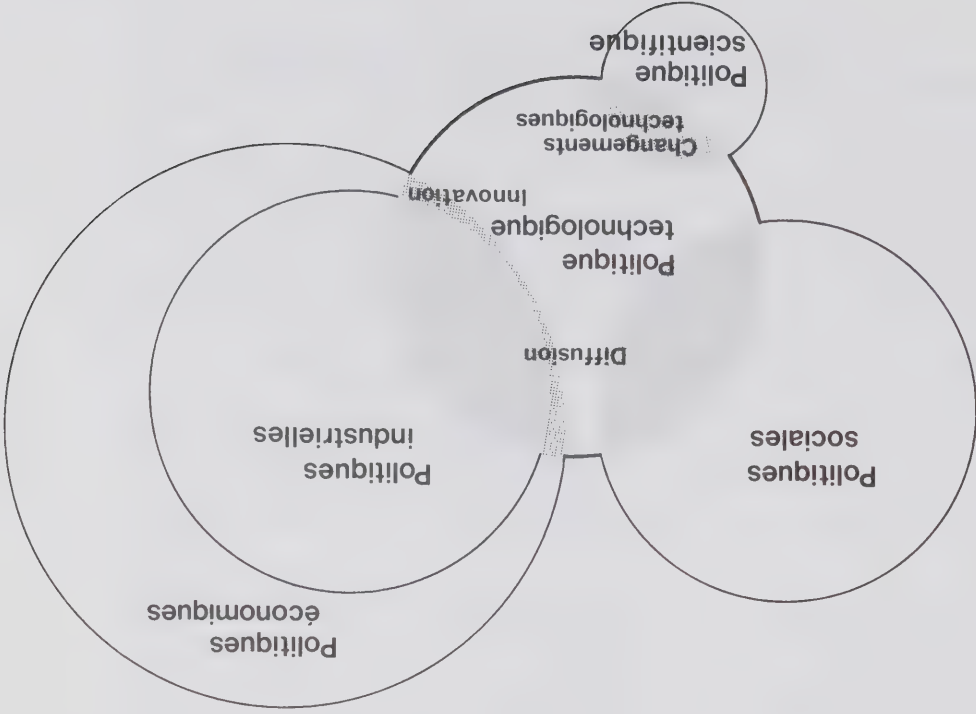
La politique technologique touche au développement, à l'application et à la diffusion de connaissances scientifiques et techniques dans l'économie canadienne. Une des caractéristiques les plus importantes d'une telle politique est qu'elle ne peut exister seule.

La politique technologique se rattache à la fois à la politique économique et à la politique industrielle et, par là même, ne peut être parfaitement efficace sans cette interdépendance. On ne peut pas non plus la séparer de la politique sociale en raison de ses conséquences sur l'emploi, sur la santé, sur le milieu, sur le genre de vie et sur d'autres questions sociales.

De même, on ne peut envisager les politiques technologiques indépendamment des politiques scientifiques; la recherche fondamentale, essentielle à la science, a souvent servi d'inspiration à des bonds remarquables dans le progrès technique.

Le diagramme suivant simplifie schématiquement ces corrélations complexes.

La politique technologique sa portée et sa nature



Avant-propos

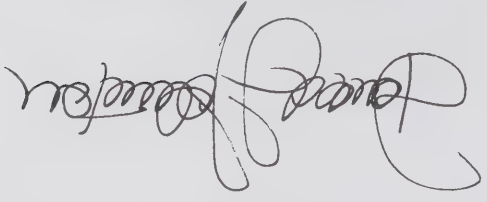
Comme les autres nations industrialisées du monde, le Canada se situe au commencement d'une ère nouvelle. Les progrès techniques d'aujourd'hui façonneront cet avenir plein de promesses.

A juste titre, les Canadiens peuvent être fiers de la contribution que leur pays apporte à la science et à la technologie. Nous avons été les premiers à utiliser un système national de communication par satellite et nous avons atteint une réputation internationale d'excellence dans les domaines de la télédétection, des sciences de l'espace et des télécommunications. La performance extraordinaire du télémanipulateur Canadarm, au cours du vol de la navette spatiale Columbia, est un autre succès canadien.

Le gouvernement du Canada est déterminé à faire en sorte que nos immenses possibilités techniques servent au maximum à l'avantage économique et social du pays. Le groupe de travail sur la science et la technologie, mis sur pied lors du sommet économique de Versailles en juin 1982, insiste, dans un récent rapport, sur les effets envahissants que la science et la technologie ont dans nos vies et réclame une plus grande sensibilisation et une planification de ces changements par tous les gouvernements. Le Canada participe à ce groupe de travail et a réagi rapidement aux défis offerts dans ce rapport.

Le gouvernement fédéral accorde une haute priorité à faire entrer la technologie dans le courant de la politique de développement économique de telle sorte que les avantages des techniques existantes et proposées contribuent au maximum au mieux-être de tous les Canadiens.

La prospérité des années 90 n'est possible que si nous utilisons efficacement les possibilités des années 80.



Donald J. Johnston
Ministre d'État
Développement économique
Sciences et Technologie

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En route vers 1990: Le développement technologique du Canada



Ministère d'État

Ministry of State

Sciences et Technologie
Canada

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En route vers 1990: Le développement technologique du Canada

Canada

Release

For release

A TECHNOLOGY POLICY FOR CANADA

A Technology Policy for Canada was presented today in the House of Commons by the Honourable Donald J. Johnston, Minister of State for Science and Technology and for Economic Development.

"I am confident that this Technology Policy will make a major contribution to our ability to confront the demands of the 1990's with a healthy, productive and vigorous economy," said Mr. Johnston.

"The Budget has dedicated over \$700 million for technology development over the next two years," said Mr. Johnston. "Never in the history of this country has such an effort been made to enhance the technology base."

Stressing the importance of managing technology development as an integrated policy area with separate, but synergistic components, the Minister announced the establishment of a Sub-Committee of Cabinet on Technology Development. Under Mr. Johnston's chairmanship, the Sub-Committee will be dedicated to ensuring that the technology policy objectives are co-ordinated, coherent and translated into action. In this context, Mr. Johnston announced several early initiatives which will provide an additional \$100 million support to technology development in Canada over the next two years.

...more

Mr. Johnston also noted the support given in the recent Budget announcement for research and training facilities, high technology procurement and human resource development. "I am particularly pleased," said Mr. Johnson, "to see the proposals for making the tax incentives for research and development simpler and more effective." These proposals, which will be discussed with industry, are expected to contribute a further \$100 million in industrial incentives for research and development.

Reflecting on the rapid changes caused by technology, Mr. Johnston stressed that the Government of Canada is committed to ensuring that all Canadians have the opportunity to benefit from technological advance and that those Canadian workers who may be adversely affected are given adequate support during any necessary adjustment period.

For further information, contact:

Ministry of State for Science and Technology

Audrey Robinson	or	Joanna Warwick
996-0326		995-3093

BACKGROUND NOTES

CANADA TOMORROW CONFERENCE

In the Fall of 1983, the federal government will sponsor a conference on technology development called "Canada Tomorrow". The theme of the conference will centre on the management of technological change, particularly as it influences and is influenced by social, economic, industrial and science and technology policies.

The "Canada Tomorrow" conference will bring the social and economic aspects of technology development together in one forum, and, with wide participation from labour, business, universities and government, it will provide the opportunity to form a deeper understanding of each other's requirements and concerns.

PUBLIC AWARENESS OF SCIENCE AND TECHNOLOGY

In recognition of the important role that the general understanding of science and technology has in our country's ability to successfully manage technological change, the federal government has established a program to foster public awareness of science and technology.

An annual fund of \$1.5 million has been established to provide support to public awareness initiatives originating from outside the government and to encourage cooperative projects by federal departments in areas of public awareness and education.

Administrative details and guidelines for the program will be announced shortly.

For further information, contact:

Kathleen Campbell
Ministry of State for Science and Technology
996-3501

THE INDUSTRIAL RESEARCH ASSISTANCE PROGRAM

The federal government has committed \$20 million over the next two years to the expansion of the Industrial Research Assistance Program (IRAP) administered by the National Research Council.

IRAP services aim at improving the performance of small and medium sized enterprises and promoting industrial growth, new jobs and greater productivity. IRAP also assists companies in new product development and in the modification of existing processes.

The Field Advisory Service (IRAP-C) and the Technical Information Service (IRAP-F) which provide technical information and advice on manufacturing problems to improve productivity and to promote the use of research results in industry across Canada will receive increased funds to allow the National Research Council to set up regional offices across Canada. This increase will also help to fund additional staff in the Provincial Research Organizations, which augment the Field Advisory and Technical Information services in some provinces.

The increase also adds funds to the services offered under IRAP-L, IRAP-H and IRAP-M, which respectively allow small businesses to contract for research, hire undergraduates to solve problems, and allow firms to conduct small in-house R&D projects. The main IRAP service, which offers assistance to industry for applied research projects lasting for two to three years (IRAP-P), received extra funding of \$4.2 million in late 1982.

The 1983/84 budget for the Industrial Research Assistance Program, not including the announced increase, totals \$38.5 million.

For further information, contact:

J. H. Braams
Industrial Research Assistance Program
993-2012

RESEARCH AND DEVELOPMENT TAX INCENTIVES

The April 1983 budget introduced tax measures to assist industrial research and development in Canada.

The changes will enhance the ability of firms to use their investment tax credits earned on eligible capital expenditures. The Investment Tax Credit, which ranges from 7% to 50% depending on the type of investment and the region in which it is made, is deductible from federal tax otherwise payable.

Previously firms could only deduct a maximum of \$15,000 plus one-half of federal tax in excess of \$15,000, and unused credits could be carried forward for five years subject to the same limits. The April 1983 budget removes these limitations for investment tax credits earned after budget day.

Furthermore, the budget proposes to extend the carryforward of investment tax credits earned after the budget day to seven years and to allow a carryback of credits. This carryback will be phased in so that credits earned in the 1983 tax year may be carried back to 1981, and credits earned in 1984 and later may be carried back three years.

To accelerate private sector investment and strengthen the recovery, the budget proposed to temporarily change the Investment Tax Credit. A portion of the Investment Tax Credit earned on investments between April 19, 1983 and May 1, 1986 would be refunded directly in cash to taxpayers who could not otherwise use their credits to reduce their tax. The portion would be 40% for small business and 20% for other businesses.

These general tax measures apply to all businesses and will provide research and development performers with an additional \$85 million dollars in the first year in which they apply.

A paper entitled Research and Development Tax Policies was tabled with the budget. This paper assessed

Canadian tax incentives for R&D and proposed simpler, more effective and accessible provisions. This proposal will be discussed with industry.

If adopted, this proposal would replace the present "Additional R&D Allowance" which allows a deduction from taxable income of 50% for incremental R&D outlays (that amount of current and capital expenditures in excess of the average of the previous three years) with an increased tax credit for research and development. Existing tax credits which range from 10% to 25% depending on the size of the company and the region in which it operates would be increased by 10 percentage points.

This increased tax credit would be subject to the measures described earlier that apply to all tax credits.

Companies would still be able to deduct all current and capital expenditures on R&D in the year in which they are incurred.

In addition, it is proposed that corporations would be allowed to make a special incentive available to outside investors. The firm would agree to give up its R&D tax benefits for investment and its investors would receive a tax credit of 50% of the funds they advance to the R&D performer.

For further information, contact:

Radmila Swann
Ministry of State for Science and Technology
593-4281

JOINT UNIVERSITY/INDUSTRY RESEARCH

The federal government proposes to spend \$9 million over two years (1983/84 and 1984/85) to strengthen joint university/industry research and technology development.

A three month review of existing support methods and an evaluation of alternatives will be undertaken by several departments and agencies including the Ministry of State for Science and Technology, the Department of Regional Industrial Expansion, the Natural Sciences and Engineering Research Council and the National Research Council.

The review will include consultations with industry and universities to integrate the new initiative with existing federal support in this area.

The main objectives of the increased support are:

- (a) to generate and maintain core programs in fields of specialization and to develop new technologies;
- (b) to train the manpower required by industry in the development and application of advanced technologies; and,
- (c) to develop a capacity for joint research projects with universities and industry.

For further information, contact:

R.I. Patterson
Ministry of State for Science and Technology
593-4545

UNIVERSITY RESEARCH AND RESEARCH TRAINING

The federal government is increasing the funding of the Natural Sciences and Engineering Research Council (NSERC) by \$26.7 million over the next two years to assist the Council in implementing its Five-year Plan.

NSERC is the largest funder of university-based research in Canada. It supports the training of highly qualified manpower and offers research grants for projects by science and engineering professors in Canadian universities.

In 1979, NSERC developed a Five-year Plan to:

- (a) expand its research training programs to provide industry, government and universities with the specialists they will need to increase their R&D efforts;
- (b) replace and update obsolete research equipment in Canadian universities;
- (c) increase the funding of targeted research to encourage research efforts in areas of socio-economic and industrial importance;
- (d) improve discipline research which is the foundation upon which all other research and development activities are built.

NSERC's budget has more than doubled during the first three years of the Five-Year Plan, increasing from \$121 million in 1979-80 to \$244.5 million in 1982-83. Continuing government support will enable Council to pursue its objectives as outlined above.

For further information, contact:

Marilyn Taylor
Natural Sciences and Engineering Research Council
993-3659

BACKGROUND NOTES

A PROPOSAL FOR A CANADIAN COMMUNICATIONS, INFORMATICS AND SPACE RESEARCH AND DEVELOPMENT INSTITUTE

The key to successful technology development is the effective integration, at the national level, of public and private sector R&D initiatives to ensure a competitive presence in domestic and foreign markets. In this regard, the federal government has proposed the creation of a Canadian Communications, Informatics and Space Research and Development Institute (the CCIS Corporation).

Built around the nucleus of the Communications Research Centre of the Department of Communications, the CCIS would be a non-profit corporation owned by the federal government and other sponsors, which could include provincial governments and possibly private-sector organizations. Funded by a range of sources (including contributions from sponsors and contract revenues from customers), the CCIS would conduct research and development in the allied fields of telecommunications, space technology, informatics and computer sciences. Potential customers include the providers of communications facilities (common carriers and broadcasters), equipment manufacturers, federal and provincial departments and agencies, and foreign customers.

A Task Force composed of members from the government and the private sector will assess the viability of the proposed institute, examining such factors as potential participants, technologies of interest, potential for revenue generation and required levels of federal funding.

For further information, contact:

Guy Verreault
Department of Communications
995-8185

A NATIONAL BIOTECHNOLOGY STRATEGY

Advances in biotechnology will dramatically transform products and processes in the energy, food, drugs, chemicals, plastics, mining and agriculture industries. To help Canada benefit from this emerging technology, the federal government has committed \$22 million over the next two years to support a National Biotechnology Strategy.

First, the Strategy will establish a biotechnology network and will develop expertise in areas of importance to Canada's future industrial development.

A linkage between the performers and users of research would strengthen the industrial relevance of biotechnology research. Second, the Strategy proposes a federal cost-share initiative which will encourage industry, as part of the research networks, to interest universities in industrially relevant research. The industrial contribution would then be matched with federal funds. Industry could also involve Provincial Research Organizations under this new scheme.

Third, the federal biotechnology research capacity, in the National Research Council, Agriculture Canada, Environment Canada, the Department of Energy Mines and Resources and the Department of National Health and Welfare will be strengthened for the use of industries, universities and the provinces.

Fourth, the Strategy proposes to promote interchanges of personnel, equipment sharing and the sponsoring of jointly-staffed research projects.

Finally, a National Biotechnology Advisory Committee will be established to advise the Minister of State for Science and Technology and for Economic Development on biotechnology. Committee members will be drawn from industry, universities and the federal government.

For further information, contact:

C. Farina
Ministry of State for Science and Technology
593-4547

A NATIONAL MICROELECTRONICS DESIGN NETWORK

Over the next two years, the federal government will provide an initial \$7.5 million for the development of a national microelectronics design network.

The funds will be used to establish a nation-wide, university-based, computer-linked network of design and testing stations for Very Large Scale Integrated Circuits (VLSI).

Support through the Natural Sciences and Engineering Research Council (NSERC) will permit up to 30 universities across Canada to participate in a design network leading to the fabrication of prototype microelectronic chips by Canadian manufacturers. The network will provide computer-aided design workstations, linked electronically to a host computer at a coordination centre. There will also be a test station at each participating university.

The design network is an extension of an NSERC supported project involving Queen's University and Northern Telecom. Through a coordination centre at Queen's University, ten Canadian universities are now submitting VLSI chip designs to Northern Telecom for fabrication free of charge. The chips are later tested and used in experimental systems by the universities.

The new funds will enhance the ability of Canadian universities to offer specialized hands-on training to undergraduate and postgraduate students in computer science, electrical engineering and physics, and help provide the experienced graduates which are critical to the expansion of the Canadian microelectronic industry.

For further information, contact:

Marilyn Taylor
Natural Sciences and Engineering Research Council
993-3659



Minister of State

Economic Development
Science and Technology

Ministre d'État

Développement économique
Sciences et Technologie

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Government
Publications

A Technology Policy for Canada

A Statement in the House of Commons

by

The Honourable Donald J. Johnston

Minister of State

for

Science and Technology

and for

Economic Development

May 3, 1983

Canada

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working together
travaillons ensemble

Canada

It is a privilege to rise today to express my support and optimism for the Budget presented in the House by my colleague, the Minister of Finance.

The Budget offers strong medicine to deal not only with the acute problem of unemployment today, but also with the chronic problem of slow productivity growth Canada has experienced over the past decade.

Technology development is central to both these issues, and I am confident that the proposals I am presenting today for a technology policy for Canada will restore our ability to confront the demands of the 1990's with a healthy, productive and vigorous economy. I am pleased that the Budget has dedicated over \$700 million for technology development in the next two years. Never in the history of this country has such an effort been made to enhance the Canadian technology base.

Technology is changing many dimensions of our lives at an unprecedented pace. Communications, automation, new materials and consumer electronics are all having a profound effect on our livelihoods and our view of the world. Some of these changes we welcome, some we resist. But either way, they represent a force we cannot ignore.

Innovations in the workplace can bring new jobs and new affluence. They can also eliminate or disrupt present jobs. This government is determined to show leadership by supporting the development of new technologies to Canada's best advantage. We are equally determined that the benefits of the new technologies are shared by all Canadians.

Change is always upsetting and can often be painful. However, we must recognize that we have no choice but to change with the changing world. We must act now to take advantage of tomorrow's opportunities if we wish to continue to enjoy our high standard of living.

Canada is not the only country to face these unsettling times.

At the Economic Summit held last June in Versailles, this issue was of such priority that a special working group was established to address the world-wide concern about technological change and development. The group reached a consensus on many issues, and especially on the awareness of the profound effect of technological change on all nations. Its final report emphasizes the theme that technology -- while not a panacea for our economic ills -- is a powerful instrument which can forge a better future for us and our children. Any period of transition, such as the one we are now experiencing through technological change, is exacting and stressful. The working group has emphasized the need for special programs to promote the flexibility, adaptability and mobility of labour. Its report is optimistic that technological innovation will build the jobs of tomorrow.

Canada has been quick to respond to this challenge, and, over the past few months, has been examining how a technology policy can best work for us. We have had to take a hard look at the nature of technology itself, and to take an equally hard look at how technology interacts

with our government and our economy.

Technology is all pervasive; it touches each and every aspect of our lives. Any policy that addresses technology development must recognise this.

To be fully effective, a technology policy for Canada has to act with, and through, economic, fiscal and industrial policies. Technological advances give the life-blood to our manufacturing and resource industries. But a technology policy also has to influence, and be influenced by, our social policies. It has a profound effect on employment, our health, our environment, and even our general lifestyle.

Nor can technology policy be considered in isolation from science policy. The basic research fundamental to scientific progress has often provided the inspirational source for remarkable leaps in technological development.

The time has past when we can comfortably address each of these areas separately. If we are to compete in this increasingly competitive world -- and still maintain our standard of living-- we must have a forum that can address technology development as an integrated policy area with separate, but synergistic, components.

Because science and technology are all pervasive - and because, at the federal government level, science and technology range across programs in all major departments - communications, environment, agriculture, energy, fisheries, health and welfare - to name a few, I am pleased to report that the Prime Minister has established a special Sub-Committee of Cabinet on Technology Development which will be dedicated to achieving the integration of policy elements, and to advancing technology development in all sectors. Each Minister on the Sub-Committee has the authority, resources and influence to bring about the required changes through creating new programs or through adapting existing ones in specific policy areas. Each Minister contributes a unique and essential point of view to the continuing development of a technology policy for Canada.

The first task of the Sub-Committee has been to confirm our policy directions for technology development in Canada. This has been done. Our objectives are set. Indeed, some of these objectives have already been translated into action in the Budget. We have also, however, established a policy framework which will maintain the Budget momentum, guide our progress and concentrate our energies on our long-term objectives. It is this technology policy which I would like to present to you today.

The first objective of the technology policy is to strengthen the Canadian economy through the creation, application and diffusion of state-of-the-art technologies.

Second, we intend to manage the process of technological development so that Canadians are aware of both the opportunities and the problems that might arise. Well informed Canadians will make the right choices for themselves and for this country.

Third, we must ensure that the benefits of technology development are shared equitably among all Canadians in every region.

And last, but by no means least, we must encourage a social climate that places a premium on scientific and technological excellence, curiosity and innovation. These are the values that will guarantee our progress.

These are the broad objectives for technology development in Canada and they set the perimeters of the path we are to follow. But a comprehensive technology policy must also recognise the contribution that each sector of our society makes to technology development, and the effect that technological change has on every aspect of our lives.

In this regard, the federal government has set some detailed objectives which relate to its interactions with each sector. I would like to touch on a few of them to illustrate the depth of commitment this government has towards our technological future.

Our objectives relating to the business sector reflect the primacy of the private sector in initiating innovation and new investment. We will support the initiatives of the private sector by encouraging an overall business environment that supports investment, innovation and enterprise.

Our commitment here can be seen in the tax structure we have established to encourage investment in research and innovation. Canadian tax incentives for R&D, even before this Budget, have been among the world's richest. We can look at Japan, we can look at West Germany, we can look at the United States, France, Great Britain or Sweden, and we find that with the single exception of Singapore, Canada has the most beneficial overall tax structure for R&D and its returns. Tax benefits to industry, in terms of foregone revenue to the government, are calculated to be over \$200 million for 1983.

And the Budget has significantly enriched this package. It has, for example, introduced important changes to the Investment Tax Credit which will particularly benefit small firms and significantly broaden the application of the Tax Credits.

The Budget has also made proposals which, as a former tax lawyer, I am particularly pleased to see, as they simplify the R&D tax incentives and make them more effective. These proposals are expected to contribute a further \$100 million in industrial incentives for research and development. These proposals have been put forward in the form of a paper for consultation which calls for comments by July 1, 1983, to ensure early implementation of the proposals.

In essence, these proposals recommend that the current "Additional R&D Allowance" which is based on incremental R&D expenditures, be replaced by an increased tax credit for research and development. Existing tax credits, which range from 10% to 25% depending on the size of the company and the region in which it operates, would be augmented by 10%.

In addition, in response to recommendations from industry, it is proposed that corporations who may not wish to make use of the R&D tax deduction and tax credit would be able to pass on these unused benefits through a special incentive to outside investors. This change would greatly improve the ability of firms to attract outside

financing during critical growth periods, and will, I believe be very much welcomed by the business community. It should go a long way towards improving the equity base of many Canadian firms, particularly young growing firms in areas of advanced technology.

Another federal government objective in relation to the business sector will ensure that current industrial support programs for technology development continue to be effective and that Canadian firms have access to the most productive, up-to-date technologies available.

In support of this objective, the federal government will spend \$20 million over the next two years to expand the National Research Council's Industrial Research Assistance Program. In particular, the Field Advisory Service and the Technical Information Service will now expand their current services to small and medium-sized businesses, greatly assisting the diffusion of needed technologies to all companies across Canada. This is one part of the \$100 million that the government has committed to new technology initiatives over the next two years.

The federal government's primary objectives with regard to labour concern our ability to anticipate the impact of technological change in order to minimize its negative aspects. I am sure that most people welcome the idea that the new technologies will eliminate many arduous, boring and repetitive jobs. I think people look forward to the prospect of the exciting, challenging and better paid jobs offered by the new technologies. The government is committed to ensuring that all Canadians have the opportunity to benefit from technological advance and that those Canadian workers who may be adversely affected are given adequate support during any necessary adjustment period.

We are determined to make training and educational opportunities available to Canadians who wish to participate actively in the technological future. Canada will increasingly need well-educated and highly skilled workers to direct our technological advance. Also, as technology is subject to rapid change, these workers will need to constantly upgrade their skills. To support this training, the Budget has allocated an additional \$155 million for human resource development programs. This year, funds for skills development in occupations for significant economic growth have grown to \$1.2 billion. Over 250,000 Canadians, half of them young people, will benefit. In addition, the Canada Student Loans Act will be expanded by \$60 million to \$141 million this year.

Another objective of our technology policy is to encourage labour-management mechanisms at all levels to encourage joint planning for technological change. We will also support organized labour in its study of the issues brought about by this change and in its preparations and efforts to deal with them.

The federal government has approved a \$10 million fund to be spent over the next two years to encourage business and labour to establish a centre for productivity and employment growth. The centre will be funded initially by the federal government, but its overall direction will be defined by business and labour. My colleague, the Honourable Charles Caccia, Minister of Labour, noted in the House last week that there is an urgent need in Canada for a forum for effective

cooperation and consultation among all sectors. The Minister of Labour and the Honourable Edward Lumley, Minister of Regional Industrial Expansion will soon be initiating consultations with business and labour groups to establish guidelines for such a centre and to choose a name which will reflect its role in encouraging productivity and in easing labour's adjustment to technological change.

Government policies and programs are targeted to areas likely to have the greatest long-term impacts on new technologies. The university sector is one such area where research involves the training of people needed in our increasingly technology-dependent economy. While the universities' capacity for fundamental research must be maintained, the federal government would also like to foster a core of excellence within the university structure which conducts research relevant to industry.

To support university research and enhance its contribution to technology development, the federal government will increase the funding of the Natural Sciences and Engineering Research Council by almost \$27 million over the next two years. This will also help the university/industry liaison for technology development by strengthening the Council's efforts to encourage engineering research and increased research between the university and industry sectors.

It is also an objective of our technology policy that industry become more aware of the research in the universities, and, at the same time that science in the universities and federal laboratories be better attuned to the opportunities of the industrial world.

The federal government will spend \$9 million over the next two years to strengthen joint university/industry research and technology efforts. These expenditures will be used to build upon the federal government's current university/industry programs to generate and maintain core research in areas of specialization and also to train the research manpower required by industry. In this way, these new funds will further encourage integrated action between the universities and industry in areas of frontier technology and continue to foster regional technological strength.

Within the government sector itself, we will ensure that R&D in federal laboratories supports industry's needs in the context of our economic objectives. Our programs and policies will also be tailored to meet those goals.

We will be examining federal research programs to determine if there are some areas that can be made more responsive to industry needs.

One area we are looking very closely at is communications. Canada has a world-wide reputation for excellence in communications. To build upon this base, my colleague the Honourable Francis Fox, Minister of Communications, is proposing the creation of a non-profit corporation, owned by the government and others, which would conduct R&D in the allied fields of telecommunications, space technology, informatics, and computer sciences. A task force drawn from representatives from industry and the universities and the government will be established to assess the viability of the proposed institute.

The federal government is also determined that Canada meet the challenge of the emerging new technologies.

To make sure that Canada benefits fully from new developments in the increasingly important field of biotechnology, the federal government is committing \$22 million towards implementing a National Biotechnology Strategy. This Strategy will support research networks -- involving government, university and industry -- which will concentrate on using biotechnology to improve the use of Canada's resource base and industrial development.

Microelectronics is also an important area for Canada's technological future. The federal government will be establishing an initial fund of \$7.5 million over two years to support the development of a National Microelectronics Design Network. The funds will help establish a university-based, computer-linked network of design and testing stations for Very Large Scale Integrated Circuits. About thirty universities are expected to participate in the expanded design network which will be closely integrated with the current work of industry in the microelectronics field. These facilities will help train the manpower critical to the expansion of the Canadian microelectronics industry and make an important contribution towards the creation of a technologically oriented workforce for Canada.

Success in all these initiatives depends on the awareness of science and technology on the part of the public. We are on the threshold of an era in which many activities involve understanding and living comfortably with science, mathematics and technology. A growing number of public and professional decisions require awareness and familiarity with the activities, principles and methods of science and technology. To promote this awareness, the federal government will be establishing an annual fund of \$1.5 million.

I am also pleased to announce that the federal government will sponsor a national "Canada Tomorrow" conference in the Fall of 1983 which will highlight the effective management of technological change, especially as it affects the working Canadian and industry and trade in this country. This forum will bring the various sectors involved in technology development together, that is labour, business, universities and government, to form a deeper understanding of each other's requirements and concerns.

The provinces also have an important part to play in our country's technological development. Most of the provinces have become very active in this area over the past few years. The federal government will be working closely with the provinces to achieve the synergism and harmonization of objectives, policies and programs which will really get Canada moving again. We want to see people in all regions of this nation have similar ranges of opportunity and we will ensure that each region takes the best possible advantage of its technological opportunities.

This government's commitment to technology is evident, both in level of current support to research and innovation and in the strong support which the budget has given to research and technology.

The Special Recovery Capital Projects program has allocated \$290 million over the next four years to establish fifteen new or expanded

research and training facilities. Projects are expected to substantially expand research capabilities to serve the forest products, fisheries, agri-food, manufacturing and mining industries. In addition, \$180 million for the accelerated procurement of high-technology electronic and communications equipment. Specific initiatives will be announced by my colleagues over the next few weeks.

As I said, \$700 million has been set aside in the Budget for technology development. This is in addition to the \$3 billion that the federal government had already budgeted for technology support in the 1983/84 estimates. It also does not include the \$200 million of foregone tax revenues for current R&D expenditures, nor the \$185 million the new tax changes and proposals would add.

We now must turn this investment into action. Central to this success is the concerted, cooperative and combined action of all sectors.

We now have the policy structure and fiscal support to push forward Canada's technological advance. It is now up to us to take advantage of the opportunities at hand to build towards a prosperous 1990.

